## WHAT IS CLAIMED IS:

1. A semiconductor structure comprising a non-single-crystal semiconductor film including a channel region for an active device, and a support substrate that supports the non-single-crystal semiconductor film, the channel region having an oxygen concentration not higher than 1  $\times$  10<sup>18</sup> atoms/cm<sup>3</sup> and a carbon concentration not higher than 1  $\times$  10<sup>18</sup> atoms/cm<sup>3</sup>.

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- 2. The semiconductor structure according to claim 1, wherein each of the oxygen concentration and the carbon concentration is not higher than 5  $\times$   $10^{17}$  atoms/cm<sup>3</sup>.
  - 3. The semiconductor structure according to claim 1, wherein the channel region includes a metal element with a concentration not higher than 1  $\times$  10<sup>17</sup> atoms/cm<sup>3</sup>.
  - 4. The semiconductor structure according to claim 3, wherein the concentration of the metal element is not higher than 5  $\times$  10<sup>16</sup> atoms/cm<sup>3</sup>.
- 5. A manufacturing method for a semiconductor structure having a non-single-crystal semiconductor film including a channel region for an active device, and a support substrate that supports the non-single-crystal semiconductor film, the method comprising subjecting an inner wall of a film-forming chamber to a surface etching process with a fluorine-based gas, coating the inner wall with an amorphous semiconductor

film with a thickness of 50 to 1000 nm, placing the support substrate in the film-forming chamber and forming the non-single-crystal semiconductor film, and melting and recrystallizing the non-single-crystal semiconductor film by heating.

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- 6. The manufacturing method according to claim 5, further comprising subjecting the inner wall to a baking process in a temperature range of 80 to  $150^{\circ}$ C.
- 7. The manufacturing method according to claim 5, wherein energy light is radiated to heat the non-single-crystal semiconductor film.
  - 8. The manufacturing method according to claim 5, wherein the non-single-crystal semiconductor film is heated for a heating time of 10 seconds or less at a heating place.
  - 9. The manufacturing method according to claim 7, wherein the heating time is one second or less.
- 10. A manufacturing apparatus for a semiconductor structure having a non-single-crystal semiconductor film including a channel region for an active device, and a support substrate that supports the non-single-crystal semiconductor film, the apparatus comprising a film-forming unit that accommodates the support substrate in a film-forming chamber and forms the non-single-crystal semiconductor film, and a crystallizing unit that melts and recrystallizes the non-single-crystal semiconductor film, the film-forming chamber

having an inner wall formed of a metal containing aluminum.

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- 11. The manufacturing apparatus according to claim 10, wherein a surface of the inner wall includes fluorine atoms and is coated with an amorphous semiconductor film with a thickness of 50 to 1000 nm.
- 12. A semiconductor device comprising a non-single-crystal semiconductor film, a support substrate that supports the non-single-crystal semiconductor film, and an active device having a part of the non-single-crystal semiconductor film as a channel region, the channel region having an oxygen concentration not higher than  $1 \times 10^{18}$  atoms/cm<sup>3</sup> and a carbon concentration not higher than  $1 \times 10^{18}$  atoms/cm<sup>3</sup>.
- 13. The semiconductor device according to claim 12, wherein the active device is a thin-film transistor including source and drain regions disposed on both sides of the channel region in the non-single-crystal semiconductor film, and a gate electrode layer insulated from the channel region by an insulation film.
  - 14. The semiconductor device according to claim 13, wherein the channel region is located within a single crystal grain that has a growth direction coinciding with a direction of arrangement of the source and drain regions.
    - 15. The semiconductor device according to

claim 12, wherein each of the oxygen concentration and the carbon concentration is not higher than 5  $\times$  10<sup>17</sup> atoms/cm<sup>3</sup>.

- 16. The semiconductor device according to claim 12, wherein the non-single-crystal semiconductor film includes a metal element with a concentration not higher than  $1 \times 10^{17}$  atoms/cm<sup>3</sup>.
- 17. The semiconductor device according to claim 16, wherein the concentration of the metal element is not higher than 5  $\times$  10<sup>16</sup> atoms/cm<sup>3</sup>.

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- 18. A semiconductor device comprising a non-single-crystal semiconductor film, a support substrate that supports the non-single-crystal semiconductor film, and an active device having a part of the non-single-crystal semiconductor film as a channel region, the channel region having an oxygen concentration not higher than 1  $\times$  10<sup>18</sup> atoms/cm<sup>3</sup> and a stacking fault density not higher than 1  $\times$  10<sup>6</sup> cm<sup>-3</sup>.
- device having a non-single-crystal semiconductor film,
  a support substrate that supports the non-singlecrystal semiconductor film, and an active device having
  a part of the non-single-crystal semiconductor film as
  a channel region, the method comprising subjecting
  an inner wall of a film-forming chamber to a surface
  etching process with a fluorine-based gas, coating the
  inner wall with an amorphous semiconductor film with a

thickness of 50 to 1000 nm, placing the support substrate in the film-forming chamber and forming the non-single-crystal semiconductor film, and melting and recrystallizing the non-single-crystal semiconductor film, thus forming the active device having the part of the non-single-crystal semiconductor film as the channel region.